NOTES UPON THE *FORMICIDÆ* OF MACKAY, QUEENSLAND.

By Gilbert Turner.

I have been induced to record these notes, made while collecting ants from their nests, and observing them at large in the vicinity of my home (about fifteen miles west of the town) in the hope that they may be of interest to entomologists who are not so favourably situated, or who only know the species from cabinet collections.

I am enabled to do this through the kindness of Professor Aug. Forel, of Zurich, who has identified my specimens, described some of the new species, and given me a great deal of information about the distribution and habits of Ants in other countries.

To give some idea of the richness of ant life in this district I append a list of 140 species collected, many of which are common.

This part of the country is divisible into "forest," that is is grass land more or less thickly timbered, the prevailing trees on which are some half-dozen species of eucalypts: and "scrub," which only occurs on the hills, and in narrow belts along the watercourses; no grass grows upon this sort of country, which is very thickly timbered, and is sometimes almost impenetrable from the abundance of vines and climbing plants.

Ants are far more numerous in the forest than they are in the scrub lands, because in the former those species which frequent the ground can get an abundance of light and sunshine in which to air their pupæ, whereas in the latter the foliage of the trees forms such a dense shade, that very little direct sunshine can reach the ground or indeed penetrate beyond the tangled foliage above. It is remarkable how very few species frequent the trees in the scrub, but this is probably owing to the great numbers of

the savage little green tree ant, *Œcophylla smaragdina*, Fab., var. *virescens*, Fab., which attacks everything that comes in its way.

These ants build nests by drawing the leaves together with a web, forming the tip of a branch into an irregular rounded mass often over a foot in diameter and partitioned off into irregular cells or chambers among the enclosed leaves. These nests are constructed in the tops of the smaller scrub trees or undergrowth, and might at first sight be taken for immense spider nests. They swarm with ants, and it is a common incident when pushing one's way through the creepers to tear one of their nests and have a swarm of these savage little creatures come tumbling down on one's head, and where an ant falls he hangs on with his long sharp jaws, and each has to be picked off before one is rid of them. They range from Mackay to the New Guinea scrubs, if not further,* and are the pirates of the tropical scrubs, destroying an immense number of insects. The wild bees forming "honey bags" in the tree trunks protect the entrance to their nests with a funnel-like rim of propolis to keep them out; but if this rim gets damaged the cunning little ants will crawl upon the broken edge and pick off each bee as it comes out; and it is wonderful that any insects live in scrub in which the ants are so numerous.

So far as my knowledge at present extends, about twenty species are confined to the scrub, though only twelve of these can be said to be strictly scrub species; the others having been found so rarely as to make it a matter of doubt whether with extended research they might not occur also in the forest. Although the line of demarcation between the forest and scrub is nearly always sharply defined, yet this is not always the case with the range of the different species of ants; *Œcophylla smaragdina* even occasionally encroaching but never very far, into the forest country, while there is one forest ant frequently ranging a short distance into the scrub. This naturally makes it difficult to determine to which class of country a species belongs when it is rare and only found at the junction of the scrub and forest.

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* The typical *Œ. smaragdina* found in India is of a yellow colour. Other species are found in Africa.

Stony pockets of forest land running up into the scrub, and stony ridges near the jungle seem to be most favoured by the ants; the land in these places is usually poor and thinly covered with grass, and every log or stone protects one or more of their nests; this land is drier than the surrounding country and is seldom visited by an animal larger than a wallaby, which keeps to its beaten track, so that the ant-nests are seldom disturbed.

Among the larger ants *Camponotus novæ-hollandiæ*, Mayr, *Leptomyrmex erythrocephalus*, Fab., and *Myrmecia nigrocincta*, Mayr, are very plentiful, and appear to be about equally distributed in both the forest and the scrub, and the same may be said of one or two of the smaller species.

A fact worth mentioning in connection with this point is, that of three species, *Polyrhachis lævior*, Rog., *Pheidole proxima*, Mayr, and an undescribed *Cremastogaster*, which I have only found in the forest, there are new varieties or races which are only found in the scrub. Another species, *Pheidole variabilis*, Mayr, common in the forest, always forms its nest on the ground under logs or stones, but there is a new variety of this species found both in the scrub and forest which always builds its nest in cavities in living trees, or in rotten timber lying on the ground; this is the only species of this genus that in this district does not make its nest on the ground.

Out of twelve species confined to the scrub, Professor Forel determined seven to be new; two others new varieties of described species, the typical forms of which have not yet been found here; two species have not yet been determined, and the remaining one is the widely distributed *Œcophylla smaragdina*. It is therefore evident that the scrub has hitherto not been so closely hunted over by collectors as the forest, and even with my opportunities for collecting in it, I know that a great deal remains to be done in this class of country.

The genus *Camponotus* is represented by fifteen species, one of which when submitted to Professor Forel was found to be new, and another which had been wrongly named has since been described by him.*

* Ann. Soc. Ent. Belg. Vol. xxxix. 1895.

With the exception of two of these species that sometimes range into the scrub, all of them are confined to the forest lands; they usually make their nests in the ground under logs or stones, but some species, though naturally subterranean in their habits, sometimes depart from the general rule and construct their homes in hollow trees.

Camponotus intrepidus, Kirby, makes its nest in the ground, forming a conical mound about a foot in height and eighteen inches in diameter at the base; the earth is excavated from the galleries below, which form the main part of the nest, but the raised dome above it is full of irregular chambers in which numbers of males, females and pupæ as well as workers are living in the early summer. These ants seem to form colonies, as their nests are generally found in groups of two or three to sometimes a dozen within a radius of twenty yards.

I have only succeeded in obtaining a complete series of specimens of the following five species: the males and females of *Camponotus æneopilosus*, Mayr, are plentiful in the nests in October and November; those of *C. novæ-hollandiæ*, Mayr, in the latter month, and those of *C. dorycus*, Sm., var. *confusus*, Em., *C. nigriceps*, Sm., and its variety *C. dimidiatus*, Rog., towards the end of December and January; but the time of the appearance of the sexes depends a good deal upon the season.

The genus *Polyrhachis* is represented by no less than twenty-five species, in addition to which there are some seven or eight varieties or races; many of the members of this genus are remarkable for the beauty of their colours and symmetrical form.

Among these Professor Forel found ten new species*, most of the varieties unknown. Another species, *Polyrhachis dives*, Sm., also identified by him, very common in tropical Asia, has been found by me for the first time in Australia.

This group of ants are both arboreal and terrestrial in their nesting habits; the nests of eleven species are always found in the ground, many of which are variable in their construction even in

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* Ann. Soc. Ent. Belg. Vol. xxxix. 1895.

the same species, sometimes consisting simply of excavations in the ground under logs or stones, while at other times they form their galleries under a tuft of grass, covering it with a mound of earth a foot in height; sometimes the mound is composed of vegetable débris, particles of soil, &c., all held together very loosely by a kind of web, but the latter is a rare form.

The only nest of *Polyrhachis dives* found was formed somewhat in this manner, without any particles of soil, being built round a small tree, unconnected with the ground, and about three feet up the stem, some smaller branches and long blades of grass being enclosed. The whole nest was oval in form, measuring a foot in diameter. Another species (*Polyrhachis* sp. ?) covered in an angle in a rock with a nest composed of the same material covered with a similar web about six inches in diameter and almost circular, the exterior being slightly convex and only attached to the rock round the edge. The entrance to this nest was very remarkable; it was situated about two inches from the junction of the nest with the rock and protected by a short tube composed of the same kind of woody débris, raised half an inch above the surrounding surface of the nest, circular in form, and not more than quarter of an inch in diameter, but slightly enlarged where it entered the nest.

Two species, *Polyrhachis ornata*, Mayr, and *P. Daemeli*, Mayr, build their nests in rotten places in timber or under loose pieces of bark, but *P. laevior*, Rog., and *P. rastellata*, Latr., form their nests in the foliage by joining several leaves together with a web; where the edges of the leaves are not in contact, the intervening space is filled up by the web, which also lines the interior of the nest; sometimes they take a single large leaf and turning it over or even rolling it up longitudinally, form a small compact nest.

The nests of the other species have not been discovered, but as the specimens have been all captured upon the stems of trees, most of them may be presumed to be arboreal in their habits.

The males and females of this genus are most plentiful in October and November, but on more than one occasion I have found both sexes in the nests in August, and once found males in

May. The winged forms are hard to find, for only those of half the species in the district have been secured.

The genus *Myrmecia* is poorly represented in this district, only three species having been collected, of which only *M. nigrocincta*, Mayr, is common. This species constructs a rounded mound of earth over the nests, and at the least alarm they come rushing out one behind the other in light skirmishing order, in a series of jumps, and from their manner of progression are often called "jumpers"; they both bite and sting very severely. The entrance to the nest is generally on the side of the mound level with the ground about Sydney, but in Mackay it is always on the top; the excavations below were followed in one nest, from which males and females were obtained in October, to a depth of two feet without reaching the end.

The only other species, neither of which is common, and whose nests never contain many individuals, are *Myrmecia auriventris*, Mayr, and a variety of *M. pilirentris*. The members of this genus, which is peculiar to Australia, are much better represented in the more arid and sandy portions of Southern and Central Australia than in the tropical regions.

The genus *Podomyrma* is well represented by some eight species, five of which were previously unknown, and some of which have since been described by Professor Forel. All these ants make their nests in cavities in the centre of living trees, the entrance to the nest being so small a hole that only one ant can pass in at a time, so that it is very difficult to locate the nest without careful observation.

Three species, *Podomyrma gratiosa*, Sm., *P. micans*, Mayr, and *P. striata*, Sm., are comparatively common, and until recently I believed that each species confined itself to a distinct species of tree, but my brother in a visit some twenty miles down the coast, where there is the same class of forest, found their nests in different kinds of timber. Where one nest is discovered there are frequently in the same tree several smaller distinct nests with separate openings that are probably offshoots from the original colony. In a nest of *P. striata* were found some curious coccids

about a quarter of an inch in diameter, firmly attached to the inner walls of the nest by a white substance.

Aphaenogaster longiceps, Sm., is a very common ant, and during the wet weather throws up mounds of about eight inches in diameter and rising to a height of three or four inches round the opening; they vary much in size and shape, and are most numerous where the grass is short, but from their loose construction are soon destroyed; it is usual in cloudy weather to see several workers on the top of the mound, but they hurry down the chamber when disturbed.

There is one species, *Leptomyrmex erythrocephalus*, Fabr., which can be described as a "honey ant," for certain workers in every nest have their abdomens greatly distended by a sweet, transparent fluid. These workers are only found at the bottom of the nest, about two feet from the surface; they can move about, but are not as active as the unaltered workers, and never leave the nest. I have occasionally found workers of two species of *Camponotus* and two of *Iridomyrmex* away from the nests with their abdomens slightly distended, but evidently only caused by a hearty meal.

One of our most extraordinary ants is *Odontomachus ruficeps*, Sm., var. *coriarius*, Mayr, a large insect measuring over half an inch in length, with very long jaws hooked at the tip and generally carried pointing straight out in front of the head; but when disturbed it opens them out until at right angles to the ordinary position on either side of the head, closing them quickly with a snap causing a clicking sound, which is evidently done to intimidate their enemies, as they do it only when frightened.

By way of experiment, a few of these ants were placed in a shallow cup about two inches deep, the sides of which sloped slightly to the rim, but too steep for the ants to climb, so they managed to get out in the following manner: opening their jaws to the fullest extent, they placed themselves head downwards with the body resting against the side of the cup, and suddenly closed their jaws with a snap, just as if a watch spring had been suddenly released, this action supplying enough impetus to not

only throw them backwards clean out of the cup but sometimes fully a foot beyond it. Wishing to see how they laid hold of anything, I let the end of a piece of string hang down into the cup, but they closed their jaws slowly in a somewhat aimless manner as if they did not understand escaping by this means.

The moment a nest of this species is disturbed, the workers come rushing out, making a curious squeaking noise quite distinct from the sound caused when the jaws snap together. This is the only ant that I have come across that emits a true sound audible to the human ear, but as yet I have not been able to ascertain how this sound is produced.

Parasitic hymenoptera (Family *Chalcididæ*) are sometimes met with in ants' nests; once when breaking up a rotten log containing a nest of *Pheidole variabilis*, Mayr, a fine specimen of *Eucharis* sp., just ready to emerge, was found among the ants. In another case, four ant pupæ enveloped in their silken cases were found in the nest of *Bothroponera mayri*, Em., and placed in a breeding bottle, where they remained from September to the middle of November, when a fine female chalcid of the genus *Rhipipallus* emerged from one, though it was not until three months later that the ants came out of the other three pupa cases.

Of the genus *Bothroponera* there are three or four large species which resemble each other very closely, and the individuals of which, when disturbed, discharge a white frothy substance from the anus; though when they sting, which they do pretty severely, they do not eject this frothy matter.

In collecting ants, spiders are frequently met with that not only closely resemble the ants among which they consort, both in form and colouration, but also in their mode of progression, so that it is only after their capture that their true affinities are revealed.

One spider takes to itself the appearance of a worker of *Leptomyrmex erythrocephalus*, Fabr., and curves its abdomen upwards and forwards until it rests on the top of the thorax, exactly the same as the ant; another bears a very strong resem-

blance to *Camponotus æneopilosus*, Mayr, while a third imitates the form of some of the species of the genus *Polyrhachis*, even to the golden pile upon the abdomen.

Since these spiders are only found in places where the ants that they resemble are also found, and as the latter are frequently found without the mimetic spiders, it is evident that it is the spiders which benefit from their striking resemblance to their hosts.

In concluding these notes, I would like it to be understood that they refer only to the *Formicidæ* collected in the immediate district, as under different conditions and surroundings it is very probable that the same species may vary both in the construction of the nest and the site chosen.

My thanks are due to Mr. W. W. Froggatt for notes and assistance in preparing this paper.

Appended is a list of species of ants collected in this district:—

FORMICIDÆ.

I. Subfamily CAMPONOTIDÆ.

Genus CAMPONOTUS.

1. *C. æneopilosus*, Mayr.
2. *C. albopilosus*, Mayr.
3. *C. arcuatus*, Mayr.
4. *C. claripes*, Mayr.
5. *C. dorycus*, Sm., var. *confusus*, Em.
6. *C. extensus*, Mayr.
7. *C. intrepidus*, Kirby.
8. *C. Janeti*, Forel.
9. *C. Lownei*, Forel (= *nitidus*, Lowne, *nec* Norton, *nec* Smith).
10. *C. nigriceps*, Sm.
    ,, var. *dimidiatus*, Rog.
11. *C. novæ-hollandiæ*, Mayr.
12. *C. reticulatus*, Rog., var. *Yerburyi*, Forel, var.
13. *C. subnitidus*, Mayr.

14. *C. suffusus*, Sm.
15. *C. vitreus*, Sm.

Genus Colobopsis.

16. *C. rufifrons*, Sm., var. *semicarinata*, Forel.

Genus Polyrhachis.

17. *P. ammon*, Fabr.
    ,, var. *angusta*, Forel.
18. *P. ammonoeides*, Rog.
19. *P. appendiculata*, Em. (race undescribed).
20. *P. daemeli*, Mayr.
    ,, ,, (race undescribed).
21. *P. dives*, Sm.
22. *P. Guérini*, Rog.
23. *P. Heinlethii*, Forel.
24. *P. Hookeri*, Lowne.
    ,, ,, var. *lownei*, Forel.
    ,, ,, var. *obscura*, Forel.
25. *P. lævior*, Rog.
    ,, ,, (race undescribed).
26. *P. micans*, Mayr.
27. *P. ornata*, Mayr.
    ,, ,, (race undescribed).
28. *P. Penelope*, Forel.
29. *P. punctiventris*, Mayr.
30. *P. rastellata*, Latr.
31. *P. semiaurata*, Mayr.
32. *P. Schenki*, Forel (two races undescribed).
33. *P. trapezoidea*, Mayr.
34. *P. Turneri*, Forel.
35-41. Undescribed species.

Genus Echinopla.

42. One undescribed species.

Genus OPISTHOPSIS.

43. *O. respiciens*, Sm.
44. One undescribed species.

Genus ŒCOPHYLLA.

45. *Œ. smaragdina*, Fabr., var. *virescens*, Fabr.

Genus LEPTOMYRMEX.

46. *L. eyrthrocephalus*, Fabr.

Genus NOTONCUS.

47. *N. Gilberti*, Forel.

Genus PRENOLEPIS.

48. *P. obscura*, Mayr.
„ „ var. undescribed.

Genus PLAGIOLEPIS.

49. *P. exigua*, Forel (var. undescribed).

Genus ACROPYGA.

50. *A. moluccana*, Mayr (var. undescribed).

Genus MELOPHORUS.

51. *M. æneovirens*, Lowne.
52-55. Four undescribed species.

II. Subfamily DOLICHODERIDÆ.

Genus DOLICHODERUS.

56. *D. Doriæ*, Em.
57. *D. scrobiculatus*, Mayr.
58. One undescribed species and one undescribed var.

Genus TAPINOMA.

59. *T. minutum*, Mayr.
„ „ (var. undescribed).

Genus TECHNOMYRMEX.

60-61. Two undescribed species.

Genus TURNERIA.

62. *T. bidentata*, Forel.

Genus IRIDOMYRMEX.

63. *I. glaber*, Mayr.
64. *I. gracilis*, Lowne.
,, ,, (race undescribed).
65. *I. itinerans*, Lowne (race undescribed).
66. *I. nitidus*, Mayr.
67. *I. rufoniger*, Lowne.
,, ,, (var. undescribed).
68. One undescribed species.

Genus BOTHRIOMYRMEX.

69. *B. pusillus*, Mayr.

Genus PLATYTHYREA.

70. *P. Turneri*, Forel.

III. Subfamily PONERIDÆ.

Genus ODONTOMACHUS.

71. *O. ruficeps*, Sm., var. *coriarius*, Mayr.

Genus ANOCHETUS.

72. *A. Graeffei*, Mayr.
73. One undescribed species.

Genus PONERA.

74. *P. lutea*, Mayr.
75. *P. melanaria*, Em. (var. undescribed).
76. *P. punctatissima*, Rog., var. *indifferens*, Forel.
77. *P. truncata*, Sm. (var. undescribed).
78. *P. trigona*, Mayr (var. undescribed).

Genus Bothroponera.

79. *B. Mayri*, Em.
80. *B. piliventris*, Sm.
„ „ var. *minor*, Forel.
81. *B. sublævis*, Em., var. *reticulata*, Forel.

Genus Ectatomma.

82. *E. convexum*, Mayr.
83. *E. metallicum*, Sm.
84. *E. (Acanthoponera) imbellis*, Em., var. *hilare*, Forel.
85. *E. (Rhytidoponera) scabrum*, Mayr.
86. One undescribed species.

Genus Lobopelta.

87. *L. conigera*, Mayr.
88. *L. excisa*, Mayr.
89-90. Two undescribed species.

Genus Leptogenys.

91. One undescribed species.

Genus Syscia.

92. One undescribed species.

Genus Sphinctomyrmex.

93. *S. Emeryi*, Forel, var. *myops*, Forel.
94-95. Two undescribed species.

Genus Lioponera.

96. *L. longitarsus*, Mayr, var. *australis*, Forel.

Genus Myrmecia.

97. *M. auriventris*, Mayr.
98. *M. nigrocincta*, Mayr.
99. *M. piliventris*, Sm., var.

IV. Subfamily DORYLIDÆ.

Genus ÆNICTUS.

100. *Æ. bengalensis*, Mayr (race undescribed)
101. One undescribed species.

V. Subfamily MYRMICIDÆ.

Genus SIMA.

102. *S. læviceps*, Sm.

Genus CARDIOCONDYLA.

103. *C. nuda*, Mayr.

Genus OLIGOMYRMEX.

104. One undescribed species.

Genus PHEIDOLE.

105. *P. brevicornis*, Mayr.
106. *P. impressiceps*, Mayr.
107. *P. longiceps*, Mayr.
108. *P. proxima*, Mayr.
,, ,, (two vars.).
109. *P. variabilis*, Mayr.
,, ,, var.
110-111. Two undescribed species.
112. One undetermined species

Genus TETRAMORIUM

113. *T. guineense*, Fabr.
114. One undescribed species.

Genus LIOMYRMEX.

115. *L. (Machomyrma) dispar*, Forel.

Genus MONOMORIUM.

116. *M. pharaonis*, Linné.
117. *M. vastator ?*

Genus DACRYON.

118. *D. omniparens*, Forel.

Genus APHÆNOGASTER.

119. *A. longiceps*, Sm.

Genus STRUMIGENYS..

120. *S. (Epopostruma) quadrispinosa*, Forel.
121. *S. (Epopostruma) Turneri*, Forel.

Genus MYRMECINA.

122. One undescribed species.

Genus CREMASTOGASTER.

123. *C. fusca*, Mayr.
124. *C. læviceps*, Sm.
125. *C. sordidula*, Nyl. (var. undescribed).
126-127. Two undescribed species.
One undescribed race.

Genus TRIGLYPHOTHRIX.

128. *T. obesa*, André, var. undescribed.

Genus PODOMYRMA.

129. *P. convergens*, Forel.
130. *P. elongata*, Forel.
131. *P. gratiosa*, Sm.

132. *P. micans*, Mayr.

133. *P. striata*, Sm.

134-136. Three undescribed species.

Genus MERANOPLUS.

137. *M. hirsutus*, Mayr.

„ „ and var

138. *M. pubescens*, Sm., var. *fenestratus*, Sm.